

PATENT
Serial No. 09/632,154

IN THE CLAIMS

The following is a complete listing of all of the claims in this application:

1. (Previously Amended) An apparatus for interaction between a plurality of users in a three-dimensional, computer-generated graphical space, comprising:

- a plurality of client processes, wherein each client process is executed on a digital computer distinct from the digital computers executing others of the plurality of client processes;
- a central server process, executed by a server computer;
- a network coupling the server computer to the digital computers which execute the plurality of client processes, thereby coupling the plurality of client processes with the central server process;
- a plurality of user objects, executed as subprocesses of the central server process, wherein each of the plurality of user objects is associated with a user in the plurality of users;
- an environment database, accessible by each client process;
- means for communicating a position of a particular user in the three-dimensional, computer-generated graphical space from the particular user's client process to the other client processes via the central server process, the means for communicating programmed according to a protocol;
- means, on a digital computer executing the particular user's client process, for receiving positions of the users of the other client processes according to the protocol via the central server process and for determining from the positions of the users of the other client processes which of the users to render;
- and means, on the digital computer executing the particular user's client process, for rendering a three-dimensional view from a viewpoint of the location of the particular user, the rendered view including at least one object from the environment database and, when

PATENT
Serial No. 09/632,154

~~B~~ other users are at locations viewable from the rendered viewpoint, including those other viewable users as determined by the digital computer executing the particular user's client process.

~~B~~ 2. (Original) The apparatus of Claim 1, wherein the environment database comprises a single central environment database.

3. (Original) The apparatus of Claim 1, wherein the environment database comprises one copy of the environment data at each of the plurality of client digital computers.

~~Sub C~~ 4. (Previously Added) A method for enabling a first user to interact with other users in a virtual space, wherein the first user and the other users each have an avatar and a client process associated therewith, and wherein each client process is in communication with a server process, comprising:

(a) receiving data relating to motion of at least some of the other users' avatars from the server process; and

~~B~~ (b) determining from the data a set of the other users' avatars that are to be displayed to the first user.

5. (Previously Added) The method of Claim 4, wherein

step (a) comprises receiving, by the client process associated with the first user, data relating to motion of at least some of the other users' avatars from the server process and

step (b) comprises determining, by the client process associated with the first user, from the data a set of the other users' avatars that are to be displayed to the first user.

PATENT
Serial No. 09/632,154

6. (Currently Amended) The method of Claim 5, further comprising the steps of
- (c) monitoring motion of the first user's avatar; and
 - (d) displaying the set of the other users' avatars from the perspective of the first user's avatar as monitored in step (c),
- wherein steps (c) and (d) are performed by the client process associated with the first user.
7. (Previously Added) The method of Claim 5, wherein step (a) comprises
- (a)(1) receiving data relating to a position and orientation of at least some of the other users' avatars from the server process.
8. (Previously Added) The method of Claim 5, wherein step (b) comprises
- (b)(1) determining from the data an actual number of the other users' avatars;
 - (b)(2) determining a maximum number of the other users' avatars that can be displayed; and
 - (b)(3) comparing the actual number to the maximum number to determine which of the other users' avatars are to be displayed.

PATENT
Serial No. 09/632,154

9. (Previously Added) A method for enabling a first user to interact with other users in a virtual space, wherein the first user and the other users each have an avatar and a client process associated therewith, and wherein each client process is in communication with a server process, comprising:

- 43
- (a) obtaining a perspective of the first user's avatar based on motion of the first user's avatar;
 - (b) receiving data relating to motion of at least some of the other users' avatars from the server process;
 - (c) determining from the data received in step (b) a set of the other users' avatars that are to be displayed to the first user; and
 - (d) displaying the set of the other users' from the perspective of the first user's avatar.
- C

10. (Previously Added) The method of Claim 9, wherein step (c) comprises

(c)(1) determining from the data received in step (b), by the client process associated with the first user, a set of the other users' avatars that are to be displayed to the first user.

11. (Previously Added) The method of Claim 10, wherein step (b) comprises

(b)(1) receiving data indicating a position of at least some of the other users' avatars from the server process.

PATENT
Serial No. 09/632,154

12. (Previously Added) The method of Claim 10, wherein step (b) comprises
(b)(1) receiving data indicating an orientation of at least some of the other users' avatars from the server process.

13. (Previously Added) The method of Claim 10, further comprising the steps of
(e) receiving, by the server process, data relating to motion of the first user's avatar;
(f) receiving, by the server process, the data relating to the motion of at least some of the other users' avatars; and
(g) automatically sending (1) the data relating to the motion of the first user's avatar to each of the client processes associated with the other users and (2) the data relating to the motion of the at least some of the other users' avatars to the client process associated with the first user.

PATENT
Serial No. 09/632,154

14. (Previously Added) The method of Claim 10, wherein step (c) comprises
- (c)(1) determining from the data an actual number of the other users' avatars;
 - (c)(2) determining a maximum number of the other users' avatars that can be displayed; and
 - (c)(3) comparing the actual number to the maximum number to determine which of the other users' avatars are to be displayed.

PATENT
Serial No. 09/632,154

Sub
C2
15. (Previously Added) A method for enabling two users to interact in a virtual space, wherein the first user has a first computer associated therewith, wherein the first computer has a first client process associated therewith, wherein the first client process has a first avatar associated therewith,

wherein the second user has a second computer associated therewith, wherein the second computer has a second client process associated therewith, wherein the second client process has a second avatar associated therewith, and

wherein the first and second client processes are in communication with a server process, comprising:

- 3
- (a) monitoring movement of the first and second avatars by the first and second client processes, respectively;
 - (b) transmitting data indicating the movement of the first and second avatars by the first and second client processes, respectively, to the server process;
 - (c) transmitting the data indicating the movement of the first and second avatars, by the server process, to the second and first client processes, respectively; and
 - (d) determining, by the second and first client processes, from the data indicating the movement of the first and second avatars, respectively, whether to display the first and second avatars.

PATENT
Serial No. 09/632,154

16. (Previously Added) The method of Claim 15, further comprising the step of
(e) displaying the first and second avatars when it is determined in step (d)
that the first and second avatars are to be displayed.

17. (Previously Added) The method of Claim 15, wherein step (c) comprises
automatically sending the data indicating a position of the first and second avatars, by the server
process, to the second and first client processes, respectively.

18. (Previously Added) A method for enabling a plurality of users to interact in a
virtual space, wherein each user has a computer associated therewith, wherein each computer has
a client process associated therewith, wherein each client process has an avatar associated
therewith, and wherein each client process is in communication with a server process,
comprising:

- (a) monitoring, by each client process, movement of the avatar associated
with the client process;
- (b) transmitting, by each client process to the server process, data indicating
the movement of the avatar associated with the client process;
- (c) transmitting, by the server process to each client process, the data
indicating movement of at least some of the avatars that are not associated with the client
process; and
- (d) determining from the data transmitted in step (c), by each client process, at
least some of the avatars that are not associated with the client process that are to be displayed.

PATENT
Serial No. 09/632,154

19. (Previously Added) The method of Claim 18, wherein the step (c) comprises the step of automatically transmitting, by the server process to each client process, the data indicating the movement of at least some of the avatars that are not associated with the client process.

20. (Previously Added) The method of Claim 18, wherein step (d) comprises

- (d)(1) determining an actual number of avatars that are not associated with the client process based on the data transmitted by the server process;
- (d)(2) determining a maximum number of avatars that can be displayed; and
- (d)(3) comparing the actual number to the maximum number to determine which of the avatars are to be displayed.

21. (Currently Amended) A server implemented method for enabling interaction between a plurality of users in a virtual space, wherein each user has a computer associated therewith, wherein each computer has a client process associated therewith, and wherein each computer is in communication with the server, comprising:

- (a) creating a user object for each of the plurality of users;
- (b) creating a room object for each room in the virtual space that is occupied by at least one of the plurality of users;
- (c) receiving data indicating a room, position, and orientation of each user from the user's client process; and
- (d) synchronously disseminating to each of the client processes a packet of information including the data received in step (c) ~~updating a list of avatars displayable by the~~

PATENT
Serial No. 09/632,154

~~client process~~ so that the client process can determine from the packet a set of avatars that are to be displayed.

22. (Currently Amended) A method for operating a server to enable a plurality of users to interact in a virtual space, wherein each user has a computer associated therewith, wherein each computer has a client process associated therewith, wherein each client process has an avatar associated therewith, wherein the server has a process associated therewith, and wherein each client process is in communication with the server process, comprising:

(a) receiving, from each client process by the server process, data indicating a position of the avatar associated with the client process; and

(b) synchronously disseminating to each of the client processes a packet of information including the data received in step (a) ~~updating a list of avatars displayable by the~~ ~~client process~~ so that the client process can determine from the packet a set of avatars that are to be displayed.

PATENT
Serial No. 09/632,154

23. (Previously Added) An apparatus for enabling a first user to interact with other users in a virtual space, wherein the first user and the other users each have an avatar associated therewith, and wherein the apparatus comprises a first process associated with the first user, other client processes associated with the other users, and a server process in communication with the first client process and the other client processes, wherein

- (a) each of the other client processes is operable to
1. monitor movement of the avatar associated with the other user;
 2. transmit data relating to the movement of the avatar to the server process;
- (b) the server process is operable to
1. receive the data relating to the movement of the avatars associated with the other users;
 2. transmit the data relating to the movement of the avatars associated with at least some of the other users to the first client process; and
- (c) the first client process is operable to
1. receive the data relating to the movement of the avatars associated with at least some of the other users; and
 2. determine from the data received in (c)(1) a set of the other users' avatars that are to be displayed.